

REMARKS

Claims 20-39 are currently pending in this application. Claims 1-19 have been canceled, without prejudice. New claims 20-39 have been added to more distinctly claim subject matter which the Applicants regard as the invention. Applicants submit that no new matter has been introduced into the application by these amendments.

Claim Rejections - 35 U.S.C. §102(b)

Claim 1 stands rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,113,760 to Kuriyama et al. (the '760 Patent). Claim 1 has been canceled and therefore the rejection to it has been rendered moot. Applicants submit that new independent claim 20 is distinguishable over the art of record for at least the following reasons.

Referring generally to FIG. 1 of the '760 Patent, when an arc discharge has occurred in a sputtering chamber 22, a voltage applied across the power source terminals of the sputtering apparatus is lowered. As a result, the sputtering current supplied to the sputtering apparatus via a switch Q1 is increased, maintaining an electric power supplied to the sputtering apparatus at a predetermined constant value, thereby causing fluctuation in the sputtering condition.

In contrast, it is an object of the presently claimed invention to provide a sputtering power supply unit which can reduce fluctuation in a sputtering current

(a current increase, for example) supplied to a sputtering unit even if arc discharge occurs in the sputtering unit so as to perform the sputtering stably.

In order to accomplish this reduction in fluctuation, the present invention utilizes a unique current control unit which is neither disclosed nor described in the '760 patent. Specifically, claim 20 recites in part:

...the current control unit comprises...means for calculating an instantaneous power supplied to the sputtering apparatus...[a]n integration means for detecting and integrating an error between the instantaneous power and a desired set power, a means for generating a pulse output having a pulse width corresponding to a difference between a current setting value formed on the basis of an integration output obtained from the integration unit and the current detected by the current detection unit, a means for controlling a current flowing through the current control element by feeding back the pulse output to a control terminal of the current control element; and a holding means for stopping an integration of the integration means when the first switch is closed in response to the arc discharge to hold the integration output of the integration means when the integration is stopped; whereby a current flowing through the current control element is controlled in a feed-forward manner with a duty corresponding to the integration output held by the holding means.

According to an embodiment of the present invention shown in FIG. 1, when a voltage drop of the voltage V_M caused by an arc discharge occurring in the sputtering apparatus 18 is detected at a controller 10, a transistor switch SW2 is closed and a reverse voltage from a DC power source 14 is applied to the sputtering apparatus 18, thereby stopping the arc discharge. At the same time, a switch S1 is set to an open state and a sputtering set current I_{set} having a value when the arc discharge has occurred is held as an output value of an integration circuit composed

of the amplifier 22. As a result, the sputtering current CM is held stably in accordance with the sputtering set current Iset until the operation of the sputtering apparatus is restored to a normal sputtering condition, thereby maintaining the stable sputtering.

The '760 Patent does not disclose or describe the above-mentioned features of the present invention, most notably, a current control unit which retains the sputtering current value immediately prior to an arc discharge in order to ensure stable sputtering is maintained. Further, claims 21-39 are dependent upon claim 1, which the Applicants believe are allowable over the cited prior art of record for the same reasons provided above.

Claim Rejections - 35 U.S.C. §103(a)

Claim 2 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Kuriyama '760 in view of Kuriyama et al. '418 (JP 05-311418). Claims 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuriyama '760 in view of Kuriyama '418, and further in view of Mark (US 5,303,139). Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuriyama '760 in view of Kuriyama et al. '950 (JP 2000-278950) and Kuriyama '418. Claims 9-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuriyama '760 in view of Kuriyama '950 and Kuriyama '418 as applied to claim 8 above, and further in view of Mark. Finally, claims 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuriyama '760 in view of Kuriyama '950.

In each of the obviousness rejections set forth above, the '760 Patent is the primary reference cited. Claims 2-19 have been canceled from this application and therefore the rejections to them have been rendered moot. With respect to new claims 20-39, Applicants submit they are distinguishable from the '760 Patent for the reasons set forth above. The remaining cited prior art documents do not resolve the deficiencies noted above with respect to the '760 Patent.

Double Patenting Rejection

Claims 1-19 under nonstatutory obviousness-type double patenting for the following reasons:

- (1) Claim 1 has been rejected on the ground of nonstatutory obviousness type double patenting as being unpatentable over claims 1-20 of Kuriyama et al. '760.
- (2) Claim 2 has been rejected on the ground of nonstatutory obviousness type double patenting as being unpatentable over claims 1-20 of Kuriyama et al. '760 in view of Kuriyama et al. '418.
- (3) Claims 3-7 has been rejected on the ground of nonstatutory obviousness type double patenting as being unpatentable over claims 1-20 of Kuriyama et al. '760 in view of Kuriyama et al. '418, and further in view of Mark.
- (4) Claim 8 has been rejected on the ground of nonstatutory obviousness type double patenting as being unpatentable over claims 1-20 of Kuriyama et al. '760 in view of Kuriyama et al. '950 and Kuriyama '418.
- (5) Claims 9-15 has been rejected on the ground of nonstatutory obviousness type double patenting as being unpatentable over claims 1-20 of Kuriyama '760 in view of Kuriyama '950 and Kuriyama '418 as applied to claim 8 above, and further in view of Mark.

- (6) Claims 16-19 has been rejected on the ground of nonstatutory obviousness type double patenting as being unpatentable over claims 1-20 of Kuriyama '760 in view of Kuriyama '950.

Applicants respectfully submit that all double patenting rejections are rendered moot based on the cancellation of claims 1-19. Furthermore, Applicants respectfully submit that the subject matter of new claims 20-39 is patentably distinct from cited prior art, making a Terminal Disclaimer unnecessary in the present application.

Conclusion

If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, or that a telephone interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone at the Examiner's convenience.

Applicant: Noboru KURIYAMA et al.
Application No.: 10/800,935

In view of the foregoing amendments and remarks, Applicants respectfully submit that the present application, including claims 20-39, is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,
Noboru KURIYAMA et al.

By /Ryan W. O'Donnell/
Ryan W. O'Donnell
Registration No. 53,401

Volpe and Koenig, P.C.
United Plaza, Suite 1600
30 South 17th Street
Philadelphia, PA 19103
Telephone: (215) 568-6400
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